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**NUCLEAR MYTHS AND SOCIAL DISCOURSE: THE U.S. DECISION TO PURSUE NUCLEAR WEAPONS**

by

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The 1939 U.S. decision to develop nuclear weapons is examined in light of early American beliefs about nuclear technology. I show that various cultural texts and statements by influential elites made policy makers believe in the military utility of nuclear energy. If these texts and statements had not existed, President Roosevelt might not have launched the Manhattan Project.

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# NUCLEAR MYTHS AND SOCIAL DISCOURSE: THE U.S. DECISION TO PURSUE NUCLEAR WEAPONS

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**ABSTRACT**

Why do countries want nuclear weapons? This question has plagued non-proliferation and U.S. intelligence experts since the beginning of the nuclear era. Motivations for nuclear weapons typically are viewed as the product of external variables (perceived insecurity, prestige, etc.). This thesis asserts that a different level of analysis is appropriate. It is a society's beliefs about nuclear technology that at least partially explains nuclear proliferation.

The 1939 U.S. decision to develop nuclear weapons is examined in light of early American beliefs about nuclear technology. I show that various cultural texts and statements by influential elites made policy makers believe in the military utility of nuclear energy. If these texts and statements had not existed, President Roosevelt might not have launched the Manhattan Project.

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## EXECUTIVE SUMMARY

Traditional explanations of why countries want nuclear weapons rely upon external variables to explain nuclear desires. Quite often, nuclear desires are viewed as a response to perceived insecurity or aspirations for international prestige. This thesis asserts that nuclear desires might arise independently of such explanations (security/prestige).

Socially constructed collective beliefs regarding the alleged utility of atomic technology might drive state efforts to pursue nuclear weapons. Evidence of such collective beliefs can be found in cultural texts and statements by social elites. The images these texts and statements create are manifested in social discourse. This thesis posits that examining an historical case through the social discourse level of analysis will provide clues regarding the sources of nuclear desires. The historical case is the United States.

Nearly all examinations of the U.S. decision to "go nuclear" cite fears of an alleged German nuclear program as the fundamental cause. Ignored in most of this research is the essential issue of how and why U.S. decision makers had come to view nuclear weapons as an appropriate security strategy. That is, could the views U.S. decision makers held regarding nuclear energy influence their decision-making process?

The events leading up to the establishment of the Manhattan project in 1943 suggest that collective beliefs regarding nuclear technology were indeed significant. President Franklin Roosevelt was consistently presented with nuclear myths which described the destructive potential of nuclear energy. It has been well documented that he did not fear a German nuclear program and was in fact interested in the offensive capabilities of nuclear weapons. Roosevelt's perception of those offensive capabilities were shaped by the nuclear myths he learned from his trusted advisors. The result of the myths may have been the Manhattan Project.

There are policy implications from this proposition. If beliefs about the utility of atomic technology precipitate nuclear desires, then U.S. intelligence must accomplish four tasks to understand the motivations of states to pursue nuclear programs: 1) recognize that not all desires for nuclear weapons can be explained by traditional analytical frameworks, 2) acknowledge that perhaps culturally produced collective beliefs influence decision making, 3) understand that those beliefs will be manifested in cultural texts (books, periodicals, movies), and 4) attempt to connect the beliefs described above with either state action or statements by policy makers.

# I. INTRODUCTION

American nuclear scientists gathered together at Los Alamos, New Mexico, in March 1943 to produce an atomic bomb. This U.S. Government effort, the "Manhattan Project," has been the subject of much scholarship. Nearly all examinations of the U.S. decision to "go nuclear" cite fears of an alleged German nuclear program as the fundamental cause. Ignored in most of this research is the essential issue of how and why U.S. decision makers had come to view a nuclear program as an appropriate security strategy. More specifically, the following questions arise: 1) What were popular and elite U.S. perceptions regarding the utility of atomic technology prior to 1945? 2) What were the sources of those perceptions regarding nuclear energy? and 3) Did those perceptions influence U.S. nuclear decision-making?

There are compelling reasons to explore these questions. "Realist" interpretations of early U.S. nuclear decision-making stress the significance of German nuclear activity.[1] While fears of a Nazi bomb provide an enticing argument, there remain limitations to this "security"

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[1] For discussions regarding "Realist" perspectives of political phenomena see Robert Keohane, "Realism, Neorealism, and the Study of World Politics," and "Theory of World Politics: Structural Realism and Beyond," both in Robert Keohane, ed., Neorealism and its Critics (New York: Columbia University Press, 1966).

explanation.[2] If early U.S. decision making was motivated by fears of Germany, why did an American scientist patent a process for constructing atomic bombs in 1936, years before this German threat had materialized in the consciousness of the American public?[3] How do we account for the U.S. government sponsoring efforts to research nuclear bombs over two years prior to American entry into World War II?[4] The facts of U.S. civilian and government nuclear research do not support the argument that fears of Germany motivated U.S. nuclear desires. There must be an alternative explanation.

I assert that socially constructed nuclear myths are a necessary condition for the emergence of nuclear desires.

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[2] Traditional explanations of why countries want nuclear weapons are dominated by two Realist arguments: 1) countries desire nuclear weapons to allay an alleged security threat, or 2) countries desire nuclear weapons because such weapons are viewed as trappings of national grandeur. For additional information regarding commonly accepted interpretations of nuclear desires see Benjamin Frankel, "International Political Changes and Nuclear Proliferation in the 1990's", Eric Arnett, ed., Science and International Security: Responding to a Changing World (Washington: American Association for the Advancement of Science, 1990); and George Quester, "Conceptions of Nuclear Threshold Status," Regina Cowen Karp, ed., Security With Nuclear Weapons? (Oxford: Oxford University Press, 1991).

[3] Mick Broderick, Nuclear Movies (Jefferson: MacFarland and Company, 1991), 55. Leo Szilard was the scientist.

[4] James MacGregor Burns, Franklin Roosevelt: Soldier of Freedom (New York: Harcourt, Brace, Jovanovich, 1970), 249.

This study offers an analysis of factors which may contribute to nuclear desires, not a theory for their development. Desires for nuclear weapons can arise independently of traditional explanations (insecurity, prestige). They can arise as the result of the digestion of cultural texts and statements by influential elites. I will suggest that the beliefs decision makers hold regarding the utility of atomic technology, beliefs which are socially constructed, drive efforts to acquire nuclear weapons.

**A. PURPOSE OF THESIS AND CASE STUDY SELECTION**

I examine the U.S. decision to pursue nuclear weapons "heuristically."[5] The objective of this thesis, a "heuristic case study," is to "stimulate the imagination" by identifying possible theoretical solutions to a problem and formulating general relations which were not previously apparent.[6] In doing so, those theoretical solutions and general relations may become useful in attempts to

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[5] Harry Eckstein, "Case Study and Theory in Political Science," F. I. Greenstein and N. W. Polsby, eds., Handbook of Political Science (Reading: Addison-Wesley, 1975), 113. Arend Lijphart refers to heuristic case studies as "hypothesis-generating" - see his "Comparative Politics and the Comparative Method," American Political Science Review Vol 65 (September 1971).

[6] Alexander George, "Case Study and Theory Development" The Method of Structured, Focused Comparison," Hall, Gordon, and Lauren, eds., Diplomacy: New Approaches in History, Theory, and Policy (New York: Free Press, 1979), 53.

understand contemporary nuclear desires. This thesis does not generate a set of theoretical propositions which can be empirically demonstrated. However, I believe that examining U.S. decision making at an often ignored level of analysis will generate connections between the sources of beliefs about the utility of nuclear technology and desires for nuclear weapons. Therefore, the value added of this thesis is three-fold: 1) introduce a new level of analysis for explaining nuclear desires, 2) promote a new interpretation of the U.S. decision to pursue nuclear weapons, and 3) provide a new approach for understanding current desires for nuclear weapons.

The case of the United States is examined for several reasons. First, the United States qualifies as a "hard" case.[7] It is widely agreed that the U.S. nuclear program sprouted from threats to U.S. national security during World War II. However, others assert that the principal motivation for U.S. pursuit of nuclear weapons existed independently of the German threat. As Richard Rhodes asserts, "Roosevelt was surprisingly indifferent to German

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[7] A "hard" case, of course, would be a country which it is generally recognized faced a clear, nuclear threat and decided to allay such a threat with possession of nuclear weapons. Examples of current nuclear capable states would include Israel, Russia, and the United States. An easier case to study would be countries which pursued nuclear weapons in the absence of such a threat - Argentina, Brazil, and South Africa.

nuclear activity...he was interested in the offensive capabilities of an atomic bomb."[8] Furthermore, neither Roosevelt nor any of his primary nuclear lieutenants ever sought information regarding Germany's flailing nuclear program (Hitler had announced his indifference to nuclear weapons by 1942).[9]

The U.S. decision to pursue nuclear weapons is a "hard" case for another important reason. "Nuclear technology," or practical applications of atomic science, did not exist when the United States decided to seek nuclear weapons. Not only did beliefs about the utility of atomic technology exist prior to the establishment of a U.S. atomic bomb program, but those beliefs were seductive enough to convince decision makers of their viability.

Dominant collective beliefs regarding the utility of atomic technology are the focus of this study. Collective beliefs arise from a social process. First, there are cultural referents which represent nuclear technology in a certain manner. Nuclear technology as "destructive" or "productive" are examples of such images. These images are

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[8] Richard Rhodes, The Making of Atomic Bomb (New York: Simon and Schuster, 1987), 405. Rhodes further asserts that Roosevelt's motivation to develop atomic bombs transcended the "war America had not entered...he was thinking about a military development that would change the political organization of the world." pp. 379.

[9] Ibid, 405.

refined into "myths." Myths are "collective beliefs whose truth or reality is accepted uncritically."[10] "Nuclear myths" are such beliefs about the utility of nuclear technology. Nuclear myths become the "operational code" of decision makers when those decision makers are presented with the myths from credible, trustworthy advisors.[11] In early twentieth century America, nuclear myths existed along a continuum with polar opposites of "atomic terror" and "atomic utopia." "Atomic terror" described an era of destructive weapons which provided the possessor unheralded political power. "Atomic utopia" described an era of cheap, nuclear derived electricity and atomic powered vehicles.

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[10] "Myths," Random House College Dictionary, Revised ed.,: 882. There are divergent definitions of "nuclear myths" in nuclear proliferation literature. Peter Lavoy, in "Nuclear Myths and the Causes of Nuclear Proliferation," Security Studies Vol 2 (Spring/Summer 1993) defines nuclear myths as "unverifiable truths" and "cognitive responses to the uncertain consequences of nuclear weapons acquisition and key components of national political ideologies." By contrast, I argue that there are no "uncertain consequences" about nuclear myths - decision-makers want nuclear weapons because nuclear myths provide them with coherent perceptions regarding the utility of atomic technology.

[11] Alexander George, "The Causal Nexus Between Cognitive Beliefs and Decision-Making Behavior: the Operational code Belief System," Lawrence Falkwoski, ed., Psychological Models in International Politics (Boulder: Westview Press, 1979). "Operational code" beliefs are examined further in chapter 3.

## B. AN ALTERNATIVE LEVEL OF ANALYSIS

Robert Jervis, in Perception and Misperception in International Politics, identifies four levels of analysis for studying international relations: 1) the "decision making" level which emphasizes the importance of individual decision makers in the process of political outcomes; 2) the "bureaucracy" level which stresses the significance of bureaucratic inertia and the effect of bureaucratic organizations on the development of political outcomes; 3) the "international" level which accents the import of external international variables to political decisions; and 4) the "nature of the state" level which describes how domestic politics influences political decisions.[12] This study departs from the fourth level.

The "state" level of analysis explains policies as a result of variations in social and economic structures.[13] Thus, the social and economic structure *of the state* is the variable under consideration. I assert that there is an additional level of analysis which is similar to the "nature of the state" but exists independently of domestic politics

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[12] Robert Jervis, Perception and Misperception in International Politics (Princeton: Princeton University Press, 1976), 15-30.

[13] Ibid, 21.

and structure. This level, the "social discourse," is the methodological focus of this thesis.

The "social discourse" level of analysis explains variations in political outcomes through variations in socially constructed, collective perceptions. To utilize this level, it is necessary to demonstrate three fundamental propositions: 1) collective beliefs exist, 2) collective beliefs are dynamic (they can change over time), and 3) collective beliefs influence the decision-making process. I argue that collective beliefs about the utility of nuclear technology, which result from nuclear myths, are the cause of a country's early desires for nuclear weapons. That is, not only do socially constructed, collective beliefs about the utility of nuclear technology exist (described further in chapters two and three), but those beliefs may be the crucial variable in explaining early nuclear desires.

Furthermore, I assert that images of nuclear technology are unique. They are "unique" because myths regarding practical applications of atomic science, from the very beginning, have been imbued with widespread popular fascination and political power. The myths have been presented as subjective knowledge. Therefore, this study "interpenetrates" levels of analysis to connect the myths to beliefs about nuclear technology.[14]

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[14] Phillip Tetlock, "Methodological Themes and Variations," Phillip Tetlock, Jo Husbands, Robert Jervis, Paul Stern,

## C. DESCRIPTION OF CHAPTERS

This thesis is divided into three sections. Chapter II describes the evolution of nuclear myths in pre-1945 America. I survey pre-1945 American periodicals, books, plays, movies, and statements by influential elites which speculated on the future utility of atomic technology. I survey the social discourse regarding the utility of nuclear technology. Additionally, I discuss the growth of the social significance of science and the increased prestige afforded scientists during this pre-World War II period. This chapter shows that cultural texts contribute to popular and elite perceptions of nuclear technology.

Chapter III discusses how nuclear myths become a social discourse. The chapter begins by describing how the nuclear images presented in chapter two developed into nuclear myths. I then discuss how the myths coalesced into subjective knowledge about the future utility of atomic technology. Because the myth of atomic terror was dominant, it became the common way to think about nuclear technology.

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Charles Tilly, eds., Behavior, Society, and Nuclear War (Oxford: Oxford University Press, 1989), 366. Tetlock states that through "interpenetration of levels of analysis...(it can be shown) that micro-level processes are constrained, shaped, and transformed by social systems." Also, the "content of thought - the policy options considered are dominated by the policy makers perception of macrolevel variables." The operative level of analysis for this thesis, the social discourse, are Tetlock's "macrolevel variables."

U.S. decision makers were provided with definitive ideas about atomic bombs long before any such bombs were constructed.

Chapter IV describes the events which led to the establishment of the Manhattan Project in New Mexico. While it is true that President Roosevelt decided to sponsor an effort to construct atomic bombs in 1939, there were other U.S. elites who helped launch the U.S. nuclear weapons program. I discuss how two of these elites (Leo Szilard and Vannevar Bush) used nuclear myths to convince Roosevelt to pursue the bomb. It is important to note that the elites who persuaded Roosevelt were equally as susceptible to pre-existing nuclear myths.

**D. IMPLICATIONS FOR U.S. INTELLIGENCE**

In April 1996 the U.S. Secretary of Defense issued guidance to the military services describing the nuclear proliferation threat and the manner in which the Department of Defense would counter it. The document, entitled Proliferation: Threat and Response, directs military intelligence to "assist the Department of Defense officials...(by) providing accurate and timely assessments on the motivations and plans of leaders (who desire to acquire nuclear weapons)."[15]

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[15] Office of the Secretary of Defense, Proliferation: Threat and Response (U.S. Government Printing Office, 1996), 55.

For 40 years the U.S. Government has thwarted efforts of foreign governments to acquire nuclear weapons. The principal mechanism for doing so has been to deny states the capability to produce atomic bombs. This emphasis on denial is manifested in international agreements which restrict the transfer of fissile material. Efforts to understand why countries want nuclear weapons often have been ignored.

The United States spends untold dollars for its intelligence organizations to predict accurately and understand the capabilities of existing and potential nuclear nations. This is productive. Cognizance of global nuclear weapons activities is high on the agenda of American foreign policy. Also, U.S. support of the international nuclear non-proliferation regime obligates U.S. intelligence to be a world wide leader in predicting future proliferation problems. To accomplish this monumental task, all aspects of the proliferation problem must be addressed. U.S. intelligence must make serious attempts to understand why countries want nuclear weapons.

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## II. NUCLEAR MYTHS

> "Cultural texts do not simply reveal the views of our era or some other, but the debates and dialectical tensions that structure the historical process that produces views."
>
> Jeff Smith, Unthinking the Unthinkable

Images of nuclear technology for peaceful and military uses emerged in the United States at least 40 years prior to the production of atomic bombs. Between 1900 and 1945 scientists, authors, and journalists shaped and spread speculative images of what a "nuclear era" would look like. Such image crafting produced coherent, powerful, and persuasive perceptions of the utility of atomic technology.

This section describes the evolution of collective beliefs about nuclear technology. I identify the cultural media which contributed to popular and elite perceptions about the possibilities of a nuclear future. These images of the utility of nuclear technology then became nuclear myths. Nuclear myths coalesced into what Alexander George characterizes as an "operational code" of beliefs.[16] It is demonstrated in subsequent chapters that nuclear myths facilitated the U.S. decision in 1939 to pursue atomic bombs.

Prior to 1945 there were two distinct images of a nuclear future: 1) "atomic terror" dominated by ruinous and

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[16] Alexander George, "The Causal Nexus," 95. Nuclear myths became the operational code of U.S. decision makers.

destructive bombs, and 2) "atomic utopia" characterized by cheap electricity and world peace. The fundamental difference between the two myths was the conflicting perception regarding the future utility of atomic technology. Would nuclearism usher in an era of peace, tranquillity, and a figurative return to the forbidden Garden of Eden? Or could the application of atomic technology signal doomsday for humankind?

Such a dichotomy of beliefs required reconciliation. One cannot happily wander the majestic Garden certain of a horrible and disfigured death. One of the perceptions would saturate the consciousness of American society.[17] One would lead decision makers to covet the political power inherited through mastery of atomic technology.

In this chapter, I survey elements of American popular culture, scientific journals, and statements by influential elites which inspired images of nuclear technology. From 1900 to 1945, widely circulated novels and popular motion pictures served as cultural texts for these emerging myths. The credibility of these texts (and the images) was enhanced

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[17] Antonio Gramsci, Selections from the Prison Notebooks, Quinton Hoare and Geoffrey Nowell-Smith, ed. and trans., (New York: Lawrence and Wishart, 1974), 235. Gramsci writes of "hegemony." I assert that one of the images of atomic technology would become hegemonic because it was the view which would be unconsciously absorbed by the American public and U.S. decision makers as a collective belief.

further by articles in daily newspapers and scientific journals. Such articles were often authored by reputable and well-known scientists and journalists.

The appearance of mature images of nuclear technology paralleled an increased social prestige for science. As the dawn of the "scientific revolution," the first half of the twentieth century confirmed scientists as social, intellectual and political elites.[18]

**A. POPULAR CULTURE**

Throughout the nineteenth century, a number of English language apocalyptic works of fiction popularized the notion that human civilization was doomed. Obviously, this was nothing new. Since humans have been speaking and writing, there have been mythical tales of impending disaster. What separated the novels of the nineteenth century from the folklore which preceded them was their treatment of the subject. Whereas earlier myths detailed calamities which were out of human control, nineteenth century American popular culture introduced the unthinkable - doomsday precipitated by the actions of humans.

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[18] Robert Gilpin, American Scientists and Nuclear Weapons Policy (Princeton: Princeton University Press, 1962), 4. Gilpin discusses the scientific revolution -- not the increased social prestige of science.

Biblical tales not withstanding, the late nineteenth century witnessed the emergence of detailed examples of widespread, human-wrought disaster. Spencer Weart, in Nuclear Fear: A History of Images, acknowledges Mary Shelley's The Last Man (1826) and Frankenstein (1818) as well as Jules Verne's Five Weeks in a Balloon (1862) and For the Flag (1896) as examples of such literature.[19] While none of these books described nuclear related catastrophe, they clearly introduced a new idea. This idea, that the power to destroy the earth rested in the less than capable hands of humankind, would prove useful to the impending stories which crafted an image of nuclear technology.

H. G. Wells, among "the most influential (English language) authors of the era," published The World Set Free in 1914.[20] This novel can be viewed as a watershed in the history of nuclear myths. Wells had fascinated millions of Americans with his mischievous tales of time travel, island-bound mutants, and humans in flight. The World Set Free was something of a departure from his customary fiction. By using the name of a familiar and contemporary U.S. scientist (Fredrick Soddy) and focusing upon a swiftly growing yet largely unknown science (atomic energy), Wells captured

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[19] See Spencer Weart, Nuclear Fear: A History of Images (Cambridge: Harvard University Press, 1988).

[20] Ibid, 25.

readers' imagination with his descriptions of atomic battles, atomic bombs, and atomic aftermath.

Wells so meticulously described his atomic era, which incidentally began in 1945, that he saw fit to identify the essential element of atomic weapons. "Carolinum," the fictional equivalent to the recently discovered radium, was "the most potent degenerator known to man."[21] Radium, which nearly everyone in 1914 knew, was a mysterious and fascinating element known to kill mice, burn the skin, and inspire fear in atomic scientists.[22] Wells exploited this perception of degenerative atomic elements for the purpose of making his element, and atomic war, more plausible. He writes of how one person could carry Carolinum in a handbag with "an amount of latent energy sufficient to wreck half a city."[23] The laboratory experiments with radiation (dead mice and irritable skin burns) paled in comparison to Wells' destructive images of degenerative elements (a leveled metropolis).

In addition to the accounts of atomic elements, Wells' description of the atomic battles must have offered little comfort to the reader. A central theme of the book, which

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[21] H. G. Wells, The World Set Free (London: MacMillian and Co., 1914), 101.

[22] Weart, Nuclear Images, 36.

[23] Wells, The World Set Free, 104.

Wells brilliantly conveys through his battle narratives, is that the power to destroy through the mysterious ways of science is ever increasing. The atomic battle accounts are brief yet unnerving. Wells provides graphic representations of atomic bomb effects. For instance, after dropping their knapsack-sized atomic bombs, airplane pilots looked down upon "a blazing, continual explosion...which emit(ed) a furious radiation of energy".[24] Later the combatants (and readers) are treated to the following:

> the bomb spread itself out into a monstrous cavern of fiery energy at the base of what became very speedily a miniature active volcano.[25]

Lawrence Freedman states that through these "fiery...active volcanoes...entire centers of population (were obliterated through) atomic warfare."[26]

In Wells' book, such devastation caused by atomic bombs translated into "a sense of destruction so far reaching and of a world so altered that it seemed foolish to go in any direction."[27] Statements such as this demonstrate that Wells envisioned a surreal feeling of disconnect associated with atomic warfare. His characters must have experienced

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[24] Ibid, 101.

[25] Ibid, 102.

[26] Lawrence Freedman, The Evolution of Nuclear Strategy (New York: St. Martin's Press, 1981), 10.

[27] Wells, The World Set Free, 128.

intense feelings of separation, helplessness, and annihilation after the atomic bombs were dropped.[28] There was a sense that hope was lost. The atomic terror images offered by Wells, again, were of total destruction.

Though by no means flooding the market of ideas in the realm of popular culture, there were other pre-1945 media which offered nuclear fantasies. Penguin Island, which was written by Anatole France and published in 1909, detailed the exploits of physics-minded terrorists who were determined to blow up the world with their pocket-sized atomic bombs.[29] Later, there was a notable 1938 novel which featured a character intent upon ending the world through a nuclear explosion which could "peel the skin off the earth like an orange, only faster."[30] Children and young adults were exposed to similar images while reading comic books which ranged in popularity from the venerable Batman to the now defunct Dr. Radium. Though not a novel, the traveling stage show Wings over Europe (which appeared in New York in 1928 and remained a popular college theater production)

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[28] Robert Jay Lifton, Death in Life: Survivors of Hiroshima (New York: Simon and Schuster, 1967), 486. Lifton states that such feelings were common among survivors of the Hiroshima bomb.

[29] Weart, Nuclear Fear, 23.

[30] John B. Priestley, The Doomsday Men: An Adventure (London: Heinemann, 1938), 277.

centered around a youthful scientist who allegedly discovered the secret to releasing atomic energy. The scientist, Francis Lightfoot, proclaimed he had "the power of...a god, to slay and make alive."[31]

In 1940, Time magazine published an article entitled "Atomic Power in Ten Years?" Nestled between advertisements for high-powered telescopes and bourbon whiskey, this article was later characterized by the U.S. Congress as a "guide" to understanding atomic power.[32] As such, the article details the late 1930's advances with uranium and the immense energy derived from its nuclear bombardment. Toward the end, the article turns to probable applications of atomic technology. The last sentence of the article, the last impression left to the reader, is the following:

> Still in the distant future is the old dream of cracking a cup full of atoms to drive locomotives, blow up the Western Front.[33]

So it is that there were readily available popular media, prior to 1945, which represented atomic energy as a

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[31] Weart, Nuclear Fear, 19. From Robert Nichols and Maurice Browne, Wings over Europe; a dramatic extravaganza on a pressing theme (1928; New York: S. French, 1935).

[32] Senate Subcommitte on War Mobilization of the Committee on Military Affairs, The Social Impact of Science: A Select Bibliography, 79th Congress, 1st session, 1945, S. Res 107 and S. Res 146, pp. 49. The article was listed with various other selections which would acquaint the public with the possibilities of atomic power.

[33] "Atomic Power in Ten Years?" Time May 27, 1940: 44.

potentially massive destructive force - a force which, once harnessed, could provide the possessor power heretofore only imagined.

Co-existing with these popular atomic terror images were texts detailing an atomic utopia. Harper's magazine hailed a "new era" of atomic cars, atomic railroads, and atomic ships.[34] Indeed, a significant number of periodical titles detailing atomic technology, prior to World War II, described civilian uses with clearly positive implications.[35] Throughout the 1930's, many Americans received radiation treatment to cure various ailments. However, the atomic utopia articles which presented imagery as concrete and detailed as Wells and Time were few and far between. Atomic utopia was abstract - it was derived from a new source of intangible energy. Atomic terror was frightening - readers could connect atomic bombs with their city. In any case, popular culture provided two images of the nuclear future.

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[34] J. J. O'Neill, "Enter Atomic Power," Harper's June 1940: 7. This article was also listed in the Senate study "The Social Impact of Science." O'Neill goes so far as to speculate on the future downfall of resource dependent industries as a result of the pending atomic revolution.

[35] Weart, Nuclear Fear, 387.

**B. NUCLEAR FILMS (PRE-1945)**

Films are regarded as elements of popular culture; however, I have separated nuclear films from other nuclear related popular media because the former has coalesced into a genre. There were no fewer than 14 atomic-related motion pictures released prior to August 1945.[36] The majority of such movies borrowed their narrative structure from established American popular media. Most nuclear films portrayed an era of atomic terror. Early atomic cinema treated atomic energy as a mysterious yet powerful force; early atomic cinema provided yet more cultural referents for images of nuclear technology.

In 1917, three years after the publication of Wells' The World Set Free, Metro/Wolf studios released The Greatest Power. In this film, a scientist accidentally invents a nuclear "exonite" super-bomb which is capable of destroying the planet. After agonizing over the potential (mis)use of the weapon, he decides to inform the American government.[37] The Invisible Ray, released in 1920, is the story of a mineralogist who finds an atomic ray lethal to humans. The ray is highly sought after by international terrorists who intend to use it to gain world power.[38] Dr. Cyclops, which

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[36] Broderick, Nuclear Movies, 56-59.

[37] Ibid, 56.

[38] Ibid, 57.

appeared in 1939, revolves around a mad scientist who discovers huge radium deposits in the South American jungle. The scientist uses his radium to transmute humans and animals.[39]

Such films (which were all released by American motion picture studios) are representative, in both content and format, of many atomic motion pictures which appeared before 1945. In fact, of all 14 pre-1945 atomic movies listed in Mick Broderick's Nuclear Movies, the only "positive" images offered were of the riches garnered through possession of atomic elements.[40] The central theme is identical to that presented through other cultural media - the destructive potential of atomic energy bequeaths unrivaled power to he who possesses it.

Admittedly, of all the books written, plays screened, comics read, and movies seen, prior to 1945, those which detailed atomic-related phenomena were in the minority. All social discourse was not dominated by nuclear fantasies. However, the nuclear fantasies which did exist gained credibility through the emergence of key influential elites. Scientists and journalists who were contemporaries of this

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[39] Ibid, 58.

[40] Ibid, 57-58. Films such as Broadway or Bust(1924) and Gold(1934) detail ranchers and scientists, respectively, who finnagle their possession of atomic elements into wealth.

pre-1945 atomic media contributed to these rapidly developing myths of atomic technology.

## C. SCIENTISTS, JOURNALISTS, ELITES

Fifty years separate the discovery of X-rays from the detonation of the first atomic bomb. In that period, there were a number of historical landmarks in the development of images of nuclear technology. Prior to World War I, atomic discoveries focused on understanding the potential of the new science. Possible applications for atomic energy emerged in the 1920's and 1930's. The most interesting facet of the atomic advances of the early twentieth century are the speculations based upon these advances. It was not enough for scientists and journalists to report their achievements; many were compelled to interpret the meaning of their accomplishments. Many scientists framed their increasingly meaningful atomic triumphs in language anyone could understand; they successfully shifted their micro-scale laboratory experiments into macro-scale imagery. In doing so, they were establishing a standard dialogue which would become inseparable from perceptions of nuclear technology.

The 50 years between the discovery of X-rays and Hiroshima is also an important period in the history of science, especially when one considers the role of science and scientists in society. Atomic energy, coming as it did

on the heels of the Industrial Revolution, was another significant advance in the course of human history. In fact, the twentieth century has been characterized as the age of the "scientific revolution."[41] Not only did this "revolution" increase human power to destroy, but it precipitated a more prestigious social role for scientists.

Science, the American public believed, was the "unearthing of rational, theoretically valid, systemic knowledge."[42] Atomic energy was crucial to the popularization of science; scientists "did physics because it was there to be done and because it was wonderfully interesting."[43] In fact, atomic energy fit perfectly with the scientific ego-centric view that scientists worked on important problems which were "interesting" to the public.[44] Because they provided elegant solutions and offered "simple" results, scientists became elites to be respected.[45] They were creative, dedicated and selfless servants to the

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[41] Gilpin, American Scientists, 4.

[42] Hans Morgenthau, Science: Servant or Master (New York: New American Library, 1972), 2.

[43] McGeorge Bundy, Danger and Survival: Choices about the Atomic Bomb in the First Fifty Years (New York: Random House, 1988), 4.

[44] Abraham Maslow, The Psychology of Science (New York: Harper and Row, 1966), 122.

[45] Ibid, 122.

betterment of humankind and subsequently were exalted for their quest for truth.[46]

Essentially, science and scientists became "functionally autonomous" from public scrutiny.[47] However, science is a human enterprise and "as a social institution has goals, ethics, morals and purposes," science is pursued in the service of values.[48] Scientists who speculated upon applications of atomic energy manipulated this "myth of the autonomy of science."[49] They knew that their statements would be digested without question because they were "unearthing rational and theoretically valid" knowledge. In any case, early in the twentieth century people began to listen when scientists spoke and scientific research became a major element of national power.

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[46] Gilpin, American Scientists and Nuclear Weapons Policy, 2.

[47] Maslow, The Psychology of Science, 33. In the early twentieth century (and to some extent today), scientists were free to speculate on the applications of their laboratory experiments without question. Quite often, because of the social prestige accumulated by scientists, such speculations were instrumental to the formation of coherent nuclear imagery.

[48] Ibid, 127, 123.

[49] Bruno Latour, "Give Me a Laboratory and I will Raise the World," Karin Knorr and Michael Mulkay, eds., Science Observed (London: Sage Press, 1983), 145.

Perhaps this fact is best illustrated in a speech President Roosevelt gave to the Eighth Pan American Scientific Congress in Washington, D. C., in early 1940. Roosevelt described a twentieth century phenomenon which was precipitated by atomic science - the marriage of scientific research to American national power.

> Science (Roosevelt said) can be used to destroy as well as to create...If death is desired, science can do that...You and I, in the long run if it be necessary, will act together to protect and defend by every means at our command our science, our culture, our American freedom and our civilization...[50]

Roosevelt and the American public had been listening to the nearly forty years of scientific prognostications regarding atomic energy - prognostications which began to emerge in 1901.

In 1901 two chemistry professors, Frederick Soddy and Ernest Rutherford, discovered that radioactivity was a sign of fundamental changes within matter.[51] Not content simply to report their findings, Soddy proclaimed in 1903:

> our planet is a storehouse stuffed with explosives inconceivably more powerful than any we know of, and only possibly awaiting a suitable detonator to cause the earth to revert to chaos.[52]

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[50] Quoted in, Burns, Roosevelt: The Soldier of Freedom, 250.

[51] Weart, Nuclear Fear, 5. A later article by Rutherford, "Transmutation of matter," would also make the U. S. Senate's list of "guides" to understanding atomic energy.

[52] Frederick Soddy, "Some Recent Advances in Radioactivity,"

This statement, published 11 years before Wells' The World Set Free and over 40 years before Hiroshima, was among the first of scientific myths explaining the destructive power of atomic energy. It was also among the very first examples of a scientist who successfully translated laboratory experiments into tenable, real world achievements.

Soddy and Rutherford articulated their laboratory advances in such a way that certainty in the lab became certainty outside the lab.[53] Soddy later clarified himself when he stated that the person who "...put his hand upon the lever (of an atomic bomb)...would possess a weapon by which he could destroy the earth if he chose."[54] Soddy spoke of political power on the scale of Francis Lightfoot.

In the same year, 1903, a widely published Sunday newspaper supplement in the New York Times suggested that a single device, at the touch of a button, could be the "suitable detonator." Also in 1903, Soddy discovered that the citizens of Boston were repeating the claims of British

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Contemporary Review 83 (May 1903): 708-720. Quoted in Weart, 17.

[53] Latour, "Give Me a Laboratory and I will Raise the World," 165. Soddy and Rutherford, clearly, made an important discovery in atomic science. It was their ability to successfully translate that discovery into something the average American could understand that is germane. Latour discusses how Pasteur accomplished a similar feat.

[54] Bundy, Danger and Survival, 5.

physicist Sir William Crookes that atomic energy could "blow the (whole) British Navy sky high."[55] Though Soddy, Rutherford and Crookes possessed no empirical basis to assert such disconcerting claims, they fascinated the public and inspired the scientific community.

Until the 1930's, most of the speculation about atomic energy centered around the aforementioned scientific assertions. Admittedly, there were scientists and journalists who disputed the claims that atomic energy would precipitate the doomsday calculations offered by scientists such as Soddy and Crookes. There were scientists who believed in an atomic utopia. In fact, readers of the New York Times in the 1920's and 1930's were led to believe that atomic technology someday would power the entire United States.[56] General Electric supported such notions by suggesting that electricity would be "too cheap to meter" in the utopian future.[57] Senator Sheridan Downey of California gave credence to such claims when he stated in 1941 that atomic energy means "cheap and unlimited sources of energy so that airplanes can roam over the world without returning to the ground for months at a time."[58] He said in

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[55] Weart, Nuclear Fear, 25.

[56] Ibid, 12.

[57] Ibid, 12.

[58] Senator Sheridan Downey addressing the Senate Military

the same breath, "(atomic energy) would totally remake the face of the world."[59] Senator Downey was one of many influential elites who enjoyed commenting upon the possibilities of a nuclear future.

Newspapers throughout the United States would closely follow the exploits of famous physicists in the hopes of printing the latest news on atomic advances. Scientific journals, such as Science Today and Tomorrow, consistently published articles by atomic authors. Among the most influential of those authors was Waldemar Kaempffert.

Kaempffert, who was an editor for the New York Times and was frequently published in various popular scientific journals, relied upon the intense public fascination with the new science of atomic energy for the subject of his articles. In fact, his primary focus was upon the perceived benefits of the coming atomic age. He preferred to write of cheaper and more available atomic-powered transportation and super atomic gardens. Kaempffert once said sheepishly, "the temptation to make the most of the drama in an (atomic) discovery and particularly to extrapolate its consequences is difficult to resist;" for him atomic energy would become

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Affairs Committee, Hearing to Prevent Depletion of the Stock of Strategic and Critical Materials Available for National Defense Purposes, 77th Congress, 1st session, 1941, S. 994, pp. 14.

[59] Ibid, 14.

a docile servant of humankind.[60] Some of Kaempffert's readers misinterpreted his message. In 1931, Phillip H. Lieb, a concerned citizen, wrote a letter to Kaempffert's newspaper which pondered whether or not atomic energy would eventually become a "Golem which would destroy mankind."[61] Lieb's fears are significant because, clearly, they were based upon something. He connected atomic energy with the destruction of humankind through his (and the public's) embryonic knowledge of atomic energy; knowledge which had been spoon fed through popular culture, newspapers, and scientists.

Developments in nuclear science and the narrowing of the focus for images of nuclear technology accelerated quickly in the 1930's. The decade before Hiroshima saw the bombardment of neutrons and the patenting of a process for the construction of atomic bombs. Scientists such as Niels Bohr, Enrico Fermi, Albert Einstein, and Leo Szilard were practicing scientific techniques which, while too complicated for the average consumer of popular culture, would have potential "consequences extrapolated."

Among the most influential and prolific of these "extrapolators" was journalist William L. Laurence of the

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[60] Waldemar Kaempffert, Explorations in Science (New York: Viking Press, 1953), Preface, vii.

[61] Phillip H. Lieb, New York Times, 7 June 1931, Section 3, page 2. From Weart, 65.

New York Times (who was also extensively published in scientific journals such as Nature and popular magazines like the Saturday Evening Post). Laurence seemed to be present at (or was compelled to report) every atomic breakthrough during the decade of the 1930's. Laurence's friend Leo Szilard informed him in 1934 what he thought after he had perfected the process of releasing atomic energy. Szilard confided in Laurence that as he tried to sleep that night, "there was little doubt in my mind that the world was headed for grief."[62]

Later, Laurence reported in the New York Times on February 25, 1939, that Bohr and Fermi, while addressing the American Physical Society in New York, had revealed that neutron bombardment had produced a "gigantic radioactive atomic cannonball of 100,000,000 volts." Laurence subsequently made himself more clear when he wrote that the destructive power of releasing atomic energy could equal approximately 30,000,000 tons of TNT.[63]

Laurence was such a well-known and credible atomic author that an article he wrote for the Saturday Evening Post was re-published in the Congressional Record. The article states that a bomb constructed of uranium 235 would

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[62] Quoted in, William Laurence, Men and Atoms (New York: Simon and Schuster, 1959), 37.

[63] Ibid, 4, 47.

possess explosive power greater than one million times equal quantities of TNT.[64] While Laurence was often less dramatic than Kaempffert, the message conveyed to the public and policy makers in the 1930's was becoming clear. Atomic bombs would very soon become a reality; such bombs would be more destructive than anything heretofore seen.

The two most influential and timely assessments on images of nuclear technology were tailored for policy makers and therefore not immediately available to the public. On August 2, 1939 (more than two years *before* American entry into World War II), Albert Einstein, who had been expelled from Germany by Hitler and was residing in Long Island, signed a letter (Szilard had written it) to then American President Franklin Roosevelt. In that letter, Einstein briefly reviewed some of the latest breakthroughs in nuclear physics and named the scientists living in America who were responsible the advances. More importantly, Einstein described to the President the possibilities of an atomic bomb: "A single (atomic) bomb...might very well destroy a

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[64] William L. Laurence, Exhibit A, Vast Power Source in Atomic Energy Opened By Science - Relative of Uranium Found to Yield Force 5,000,000 Times as Potent as Coal - Germany is Seeking It - Scientists Ordered to Devote All Time to Research - Tests Made at California, 76th Congress, 2nd session, Congressional Record, 1940, pp. 10100. The article was also listed in the Senate's "Social Impact of Science" bibliography as a "guide" to further understanding of nuclear science."

whole port together with some of the surrounding territory."[65]

Roosevelt, the former Secretary of the Navy, undoubtedly understood. Einstein also informed the President that uranium would soon become a precious element in short supply - the best ores of uranium were found in then Nazi-occupied Czechoslovakia and the Belgian Congo. Einstein framed his letter in the context of an inevitable race with Germany for acquisition of the immensely destructive atomic bombs.[66] Essentially, he was asking Roosevelt for funds and an American establishment dedicated to the research and development of atomic bombs. He *did not* ask Roosevelt to fund the development of peaceful applications of atomic technology; he did not use utopian images.

Attached to Einstein's letter was an addendum by Leo Szilard. Where Einstein's letter appears more politically motivated, Szilard was interested in explaining to the President the process by which atomic bombs were

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[65] Albert Einstein, "Enstein Letter to President Franklin Roosevelt (August 2, 1939)," Bernard T. Field and Gertrud Szilard, eds., The Collected Works of Leo Szilard: Scientific Papers (Cambridge: MIT Press, 1972), 199.

[66] As previously stated, Szilard wrote the letter. He based his presumptions about Nazi nuclear programs on the advances of Hahn and Strassman - having no direct knowledge of their involvement or lack thereof in state sponsored research.

constructed. Not only did Szilard detail the foundations of atomic energy (drawing billiard ball analogies), but he also wrote of the significance of uranium and the strategic importance of securing the element. Near the end of his letter, the energetic Szilard described how it may be possible to construct "extremely dangerous bombs...(whose) destructive power can only be roughly estimated, but there is no doubt that it would go far beyond all military conceptions."[67]

Many believe Einstein and Szilard were motivated by the potential of obtaining funds for increased nuclear research and informing the President of the possible repercussions should Germany successfully construct an atomic bomb (so they thought).[68] However, it is important to note that their method of informing Roosevelt included using analogies for atomic imagery. As physicists, they were keenly aware of the potential of atomic bombs. As motivated elites they were keenly aware of the power of imagery.

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[67] Ibid, 201. Szilard's addendum.

[68] See for example Bundy, Danger and Survival, and Richard Hewitt and Oscar Anderson, The New World: A History of the United States Atomic Energy Commission 1939-1946 (Berkeley: University of California Press, 1990).

## D. CONCLUSION

Many pre-1945 novels, magazines, and movies fantasized about an atomic era. Those I describe are representative in content and format of the genre. From Wells, who introduced the notion of atomic warfare, to Francis Lightfoot, who boldly proclaimed the power of God from his possession of atomic bombs, pre-1945 American popular culture contained cultural referents for images of nuclear technology. The explanatory power of such referents was enhanced by statements by scientists, journalists, and influential elites. As I demonstrate, these nuclear myths appeared at a time when scientists were attaining increased social prestige. When a chemist in the 1910's stated that matter could be changed, he was no longer a possessed alchemist; he was a brilliant scientist acting independently from public scrutiny. Authors and journalists listened to him; they made him famous with tales of his exploits while often adding their own interpretation of the consequences of an atomic era.

The result, 30 years prior to Hiroshima, was a myth of nuclear technology as immensely powerful and destructive. This myth sprouted from social discourse. The myth of atomic terror was born and thrived before 1945.

## III. NUCLEAR MYTHS AND OPERATIONAL CODES

> "Everything about the atomic bomb is overshadowed by the twin facts that it exists and its destructive power is fantastically great."
>
> Bernard Brodie

The images I present thrived long before atomic energy plants or atomic bombs. In fact, identifiable images about the future utility of atomic technology preceded *any* application of such technology. The pre-1945 images created to represent the nuclear future, both utopian and terror, were socially constructed. Entering the consciousness of the American public and influential elites through cultural texts, these images evolved into nuclear myths. Furthermore, elements of these socially constructed myths were the core of collective beliefs used by U.S. decision makers to account for their pursuit of atomic bombs.

The American image of atomic terror became the dominant theme regarding the utility of nuclear technology by 1939. This dominant theme permitted the funding and pursuit of atomic bombs in 1939 (which I explain in Chapter IV). This chapter is a bridge from a sea of disparate cultural referents to a coherent "operational code" belief about an object yet to exist (atomic bombs).[69] This chapter serves

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[69] By "operational code belief," I suggest that such beliefs are more politically significant than ordinary "beliefs." I argue that George's discussion of them can be applied to beliefs about nuclear technology.

two purposes: 1) to review existing literature which connects beliefs to political outcomes, and 2) to demonstrate that the imagery presented in chapter two evolved from simple and distinct images, to nuclear myths, and then into collective beliefs about the utility of atomic technology. I describe how the images of atomic technology became a "social discourse."

In this chapter, I discuss Alexander George's "operational codes" and their potential effects on decisions. This methodology, the "congruence procedure," attempts to establish consistencies between decisions by policy makers and the beliefs held by those policy makers.[70] Myths about the utility of nuclear technology reached a critical juncture in 1939.

When Einstein signed that letter to Roosevelt that August, U.S. decision makers were familiar with the scientific facts about atomic science. The repetition of laboratory experiments had proven that the nuclear bombardment of Uranium 235 released vast quantities of energy. Potential applications to exploit that energy had not yet been demonstrated empirically. In 1939, the U.S. government was provided a viable, culturally acceptable perception of how to exploit that energy in the form of

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[70] George, "The Causal Nexus," 105.

Einstein's letter. The autumn of 1939 was an important moment in international history.

The imagery presented in chapter II generated persuasive and suggestive perceptions regarding the utility of atomic technology. The atomic future would be either wonderful or terrible. These images became nuclear myths. Nuclear myths were persuasive because they crossed chronological thresholds and were dispersed in a manner which solidified their status as "common sense." Indeed, pre-1945 nuclear myths were illustrative of the "cultural production of common sense."[71]

## A. CONGRUENCE AND OPERATIONAL CODES

George's "congruence procedure" assesses the impact of the "operational code" belief of a policy maker on his or her decisional choices. It is the process of demonstrating consistency between a political belief and the content of decisions.[72] Unfortunately, as with many social science methodologies, the most definitive conclusion possible is that the beliefs in question may have been a necessary condition for the decision which resulted. It is difficult

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[71] Jeff Smith, Unthinking the Unthinkable: Nuclear Weapons and Western Culture (Bloomington: Indiana University Press, 1989), 17.

[72] George, "The Causal Nexus," 105.

to demonstrate sufficiency. In this case, the explanatory power of the "congruence procedure" is enhanced by the reliance on myths. Because these myths existed before the application of atomic technology, decision makers were limited in their choices concerning what to believe. The notion that the nuclear future was either utopian or wrought with terror, while opposite poles on the spectrum of nuclear myths, were the only available perceptions regarding the nuclear future to pre-1945 U.S. decision-makers. Therefore, congruence between beliefs and action is made easier. Cultural images of atomic technology provided the only substance from which myths (and beliefs) about such technology could be drawn.

George deliberately describes "operational code" beliefs as inherently political. Such beliefs concern "fundamental issues of politics, history, and political action..(they regard) the processing of available information...(and the engagement) in rational calculation in pursuit of values and interests."[73] Operational code beliefs are "heuristical aides to decision making."[74]

While there is no indisputable causal nexus between such beliefs and political action, George demonstrates the

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[73] Ibid, 101.

[74] Ibid, 103.

possibility of deductively determining variables which contribute to outcomes through the congruence method. Operational code beliefs result from the processing of available information. The question, then, becomes "how did the myth of atomic terror, in 1939, become subjective knowledge about the utility of atomic science?" More specifically, how did this particular myth (as opposed to the myth of atomic utopia) become rational in the absence of any concrete basis? The remainder of this chapter is dedicated to illustrating that the myth of atomic terror which facilitated the U.S. pursuit of atomic bombs was a socially constructed system.

**B. THE FORMATION OF DISCOURSE**

A "discursive formation" describes, in a social systemic context, a regularity of concepts, thematic beliefs, types of statements and a specific system of dispersion.[75] A discursive formation can be said to exist when there are "regular relations...between styles of description" of an object.[76] In this case, the writings of Wells, the proclamations of Soddy, and the assertions of Laurence clearly qualify as "regularity" of concepts and

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[75] Michel Foucault, The Archeology of Knowledge (New York: Pantheon, 1972), 38.

[76] Jon Simmons, Foucault and the Political (London: Routledge, 1995), 24.

styles of description. Wells, Soddy, and Laurence consistently associated atomic weapons and nuclear technology with atomic terror.

Similarly, the texts which indicated that the nuclear future would be a utopian paradise demonstrated regularity in their styles of description. Senators and journalists continually spoke of atomic powered locomotives and airplanes. It is the repetition of similar themes in the history of pre-1945 nuclear myths which permits their characterization as a discursive formation. The discursive formation of the utility of atomic technology, which existed prior to any application of that technology, is the social system encompassing the concepts and beliefs about that speculative utility (utopia or terror).

Discursive formations appear as the result of established relations between social processes, institutions, and systems of norms.[77] They are formed through the digestion of popular culture and the socialization of ideas. This is a key concept. Discursive formations do not appear as the result of assigning meaning to objects; they do not necessarily come after an object exists and demands interpretation on a macro-social level. The significance of this is demonstrated through the following proposition: if there is a social mechanism for

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[77] Foucault, Archeology of Knowledge, 45.

the production of meaning, and it can be demonstrated that such a mechanism has an historical basis, *then the objects on which meaning is based are less important than the mechanism itself.* Discursive formations are such mechanisms.

"The atom of discourse," Foucault asserts, "...is the statement."[78] "Statements," essentially, are language based signs, concepts, perceptions, or categorical inferences. They are ubiquitous symbols, representations of meaning, which exist in the social world; symbols are "any significant theme which spans the spheres of reality"[79] Symbols are similar to images and are therefore often simplified for public consumption. Before 1920, the statements of Wells and Soddy certainly "spanned the spheres" of what was thought to be reality. Wells' accounts of atomic battles and Soddy's statements about the earth as a "storehouse of explosives" were symbolic because they represented a new image. Similarly, subscribers to Harper's magazine, while reading that atomic science provided the key to efficient and cheap energy, were bombarded with new images.

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[78] Ibid, 80.

[79] Peter Berger and Thomas Luckmann, The Social Construction of Reality (New York: Doubleday, 1966), 34.

These images are "anonymously dispersed through texts."[80] Coherent images about everyday life and politics are formed and diffused by people rarely read about in history books. Such anonymous "nucleators...are the true entrepreneurs of society."[81] Boulding suggests the people who possessed the creativity and imagination to articulate the images, contribute significantly to organizing social meaning. It is important to note that such entrepreneurs do not ordinarily engage in conscious and diabolic attempts to produce the building blocks of social myths. That is, discursive formations are not pre-meditated. In this case, the assertions of Wells, Soddy, Laurence, Harper's et al were the beginnings of burgeoning myths regarding nuclear utility. They were the entrepreneurs. Certainly, their statements were instrumental to the formation of a discourse.

**C. THE DYNAMICS OF DISCOURSE**

Discursive formations have chronological thresholds during which a process of legitimization and institutionalization occurs. It is through these thresholds that nuclear imagery is transformed into nuclear myths, and

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[80] Foucault, Archeology of Knowledge, 50.

[81] Kenneth Boulding, The Image: Knowledge and Life in Society (Ann Arbor: University of Michigan Press), 76.

then further refined as collective beliefs. The first such threshold, the "threshold of positivity," describes the moment at which the discursive practice "achieves individuality and autonomy."[82] The images inherent to the practice are coherent and discernible. In this case, the "threshold of positivity" for the discursive formation of nuclear myths was achieved well before 1915. The revelation that radioactivity was a sign of fundamental changes within matter and Wells' accounts of atomic battles were autonomous and coherent social images. Equally as coherent were the images that atomic technology would bring forth an elixir of life. Both types of "statements" would serve as catalysts for subsequent articulations of atomic imagery.

Images of nuclear utopia and nuclear terror, as polar opposites existing within the same discourse during this pre-1939 period, were "points of diffraction." "Points of diffraction" are:

> two concepts, in the same discourse...(which) are then characterized as points of equivalence: two incompatible (images) formed in the same way... the conditions of their appearance are identical (and) they are situated at the same level.[83]

Until 1939, the American public and U.S. decision-makers were confronted with competing notions regarding the utility

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[82] Foucault, Archeology of Knowledge, 186.

[83] Ibid, 65.

of atomic science. While Soddy's idea that an atomic bomb could destroy the earth may have been intriguing, it was difficult to dismiss the image of atomic energy as utopian. The images appeared at approximately the same time and were dispersed through the same media. It was unclear which path would be selected until 1939.

After the "threshold of positivity," a discursive formation crosses a "threshold of epistemologization." During this threshold "a group of statements claims to validate norms of verification...and exercises a dominant function."[84] At this point, certain concepts within the discursive practice become more socially acceptable than others; focused perceptions begin to dominate the discourse. These focused perceptions, in this case, constitute the nuclear myths regarding the alleged utility of atomic technology. Texts which described atomic terror and atomic utopia were no longer detailing simple "images" - they were describing refined nuclear myths regarding the future utility of atomic technology.

The moment President Roosevelt was presented with Einstein's letter in 1939 and said, in perhaps one of the greatest under-statements in human history, "this requires action," myths of atomic terror would no longer be simply "truths accepted uncritically." Myths of atomic terror, a

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[84] Ibid, 186.

discursive formation, would soon become reality.[85] Atomic technology as an immensely destructive force which provided unheralded political power to the possessor became the dominant theme surrounding atomic science. This is not to say that responsibility for atomic weapons rests upon the shoulders of Albert Einstein, Leo Szilard, and Franklin Roosevelt. Developing the myths took years; Szilard, Einstein, and Roosevelt were but partisans of a discourse over which they had little control. The discursive practice existed long before they were subjected to its social power.

Finally, discursive formations cross a "threshold of formalization" during which the formation is able to "deploy the formal edifice that it constitutes."[86] It is now, after this threshold has been crossed, that it can be said that a socially powerful and imposing discursive formation exists. By "defining the axioms necessary to it," the discursive formation has evolved into subjective knowledge.[87] Technically, an "axiom" is a self-evident truth. Foucault suggests that axioms of discourse become socially self-evident truths, their truth being derived from their

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[85] See Frances Perkins, The Roosevelt I Knew (New York: Harper and Row, 1946) and Burns, Franklin Roosevelt: the Soldier of Freedom.

[86] Foucault, Archeology of Knowledge, 187.

[87] Ibid, 187.

institutional and social status. It was no mistake that the U.S. government searched nuclear movies for alleged German atomic secrets during this period.[88] It was no mistake that the U.S. government assembled the best physicists and chemists available in New Mexico during the summer of 1943. Henceforth, the discursive formation required cultural texts to utilize the correct elements and styles of description. The myth of atomic terror developed into a cognitive barrier to competing perceptions regarding the utility of atomic technology. The correct style of description, of course, was that the future of atomic technology would mushroom into atomic bombs.

**D. SCIENCE AND OPERATIONAL CODES**

The social prestige achieved by scientists during this period was crucial to the dominance of the discursive formation of atomic terror and therefore, the character of the social discourse. By 1939, science and its practitioners retained the public status and institutional power to solidify the dominance of atomic terror. They did this by using "inscription devices...which make the perceptive judgement of others simpler."[89] Men such as

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[88] Broderick, Nuclear Movies, 57. The United States and the Allies "carefully screened" the 1934 movie, Gold, for Nazi nuclear secrets.

[89] Latour, "Give Me a Laboratory and I Will Raise the

Einstein and Szilard, as the official and public excavators of social knowledge (theoretically valid social knowledge), positioned themselves as authorities on nuclear science. What they in fact became were the official and public wardens of the discursive formation.

Myths regarding the utility of atomic technology were no longer curiosities of popular culture. The volume and consistency of atomic terror messages throughout this period was substantial and, as Berger and Luckman assert, the "reality' of the social world gains in massivity in the course of its transmission."[90] Scientists provided the impetus for coherent, collective operational code beliefs about nuclear technology. Early in the twentieth century they sold the notion that atomic science was "important" to American policy-makers and the public. From 1900-1939, vocal and powerful members of the scientific community repeatedly framed atomic achievements with destructive imagery and national power. After that, they were crucial to the refinement of that imagery into nuclear myths. All the while, scientists were harvesting increased social prestige. Suddenly, when a scientist stated that the earth could be destroyed by an atomic bomb, it became much easier

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World," 161.

[90] Berger and Luckman, The Social Construction of Reality, 58.

to believe a movie which detailed the exploits of physics minded international terrorists intent on doing just that. Scientists opened the door to the discursive formation of atomic terror and locked the exit when they finally built atomic bombs.

## E. CONCLUSION

Speculative images regarding the utility of atomic technology were socially constructed. Over time, such speculative images evolved into nuclear myths. The socially constructed system encompassing nuclear myths, the "discursive formation" of atomic technology, was dispersed through cultural media and statements by influential elites. Chronologically, nuclear myths matured as the focus of atomic science narrowed on methods by which energy could be released from bombardment of nuclear constructions. In 1939, the dilemma of two competing perceptions was solved through the skillful politicking of scientists - scientists who were crucial to the development of collective beliefs about the utility of atomic technology. Atomic terror became the dominant theme.

## IV. NUCLEAR MYTHS AND NUCLEAR BOMBS

"I refuse to work full time to make the culmination of three centuries of physics a weapon of mass destruction."

I. I. Rabi to Robert Oppenheimer in 1942

In 1939, the myth of atomic terror was the rational and collective "operational code" belief that resourceful U.S. elites needed to "go nuclear." Forty years in the making, the maturation of this collective belief stirred hopes of "the old dream of cracking a cup full of atoms." From Frederick Soddy to Leo Szilard, from The World Set Free to The Greatest Power, the myth of atomic terror was refined, transformed, and substantiated. President Roosevelt, acting on this substantiation, is a decision maker who was persuaded by nuclear myths. The manifestations of this persuasion occurred between 1939 and 1943.

This section details the pertinent personalities and events which led to the establishment of the Los Alamos Laboratory in New Mexico. Though the United States did not actually possess an atomic bomb until 1945, the period which is most politically significant is from 1939 to 1943. It was during this period that rational nuclear myths, a culmination of the process described in Chapters II and III, were the decisive factor in U.S. nuclear decision-making.

This chapter serves two purposes: 1) to historically trace U.S. atomic milestones from 1939 to 1943 while discussing the influential elites who pushed the process of

development; and 2) to examine the general decision making process attributed to Roosevelt - with specific comments regarding his thoughts on the atomic bomb. The beliefs of influential elites and Rooseveltian decision-making, unorthodox as it was, combined to form the immediate causal nexus for U.S. proliferation. While nuclear beliefs remain the focus, they need to be transmitted, shared, and processed to become politically important.

**A. THE CRUCIAL YEARS: 1939-1943**

The Einstein and Szilard letters were delivered to Roosevelt by New York financier and occasional presidential advisor, Alexander Sachs. Upon hearing the fears of Einstein and Szilard, Sachs decided that he would alert the President to the recent advancements in physics. He had worked among Roosevelt's speech writers during the campaign of 1932 and was familiar with Roosevelt's decision making process. On October 11, 1939, Sachs summarized to the President the potential of atomic energy and what should be done. As Richard Rhodes notes:

> The letter emphasized energy production first, radioactive materials for medical use second, and 'bombs of hitherto unenvisaged potency and scope' third. It proposed a government agency to act as liaison between scientific research and Roosevelt.[91]

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[91] Rhodes, The Making of the Atomic Bomb, 314. Sachs simply presented Roosevelt with Einstein and Szilard's letters, he

Ending his presentation to the President, Sachs quoted from a 1938 article in Background in Modern Science when he said, "We...can only hope (that humankind will not use atomic energy) exclusively in blowing up his next door neighbor."[92] To that Roosevelt replied, "Alex, what you are after is to see that the Nazi's don't blow us up" and then, "this requires action."[93] The "action" from 1939 to 1943 shaped both the method by which the United States would pursue the bomb and the essential personalities of the pursuit.

The immediate result of the Sachs meeting was the establishment of a subcommittee of the Bureau of Standards, the organization charged with applying science to the national interest. This committee, subsequently named the Advisory Committee on Uranium, convened ten days after the Sachs-Roosevelt meeting. Among the attendees were Leo Szilard, an Army and a Navy representative, the chairman of the Bureau of Standards, and Sachs.

The committee was convinced by Szilard and Sachs that scientific research exploring the feasibility of constructing atomic bombs was worth funding. The

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presented Roosevelt with Einstein and Szilard's letters, he did not read them. Instead, he drafted his own letter which he read to Roosevelt.

[92] Quoted in ibid, 314.

[93] Quoted in Burns, Roosevelt: Soldier of Freedom, 250.

information memorandum which was forwarded to the President stated that, "atomic bombs (in terms of destructiveness would be) vastly greater than anything now known."[94] At this point, atomic research remained scattered and without a coherent, military purpose. There were scientists across the United States who were pursuing increased knowledge about nuclear chain reactions, but they were doing so in different experimental manners and largely without close interaction.

Leaving the meeting, Leo Szilard was convinced that the U.S. government finally was taking the appropriate steps to construct atomic bombs. Curiously, Szilard is described as being "astonished" that Sachs agreed with him that atomic science was a matter "too important to wait."[95] This is "curious" because Szilard, more than anyone else, had done the most to bring the "old dream" to fruition - "he was at his best goading others into action."[96] It was he who had patented the process of constructing atomic bombs in 1936; it was he who had prodded Einstein to get involved; it was he who had told William Laurence that "the world was headed for grief;" and it was he who was "impatient" and "chafed"

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[94] Quoted in Rhodes, The Making of the Atomic Bomb, 317.

[95] Ibid, 316.

[96] Hewlett and Anderson, The New World, 15.

over the U.S. government's apparent lack of concern up until 1939.[97]

Szilard's addendum to Einstein's letter to the President was not his only foray into dispersing nuclear myths.[98] Rhodes asserts that none other than *H. G. Wells* was an "influential acquaintance" of Szilard.[99] So "influential" was Wells that Szilard quotes him in a paper he submitted to The Physical Review in 1940. The paper, "Divergent Chain Reactions in Systems Composed of Uranium and Carbon," begins with the following sentence:

> As early as 1913 H. G. Wells forecast the discovery of induced radioactivity for the year 1933 and described the subsequent advent of nuclear transmutations on an industrial scale.[100]

Wells discusses the "advent of nuclear transmutations on an industrial scale" in only one of his books, the book Szilard noted, *The World Set Free*. Szilard's use of this book

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[97] Rhodes, The Making of the Atomic Bomb, 312, 331.

[98] Szilard was what Lavoy refers to as a "nuclear myth maker." I reiterate that Szilard was not *consciously* manipulating nuclear myths to further an agenda - he was using nuclear myths to further an agenda because those myths were rational to him.

[99] Rhodes, The Making of the Atomic Bomb, 14. Szilard met Wells in London in 1929 in an attempt to get Central European copyrights to one of his books.

[100] Leo Szilard, "Divergent Chain Reactions in Systems Composed of Uranium and Carbon," submitted to the Physical Review, February, 1940, printed in Feld and Szilard, eds., The Collected Works of Leo Szilard: Scientific Papers, 218.

affirms the significance of nuclear myths. It affirms that atomic based cultural texts shaped understandings of atomic science. In any case, Szilard continued to press the American government throughout the next two years to accelerate their program.

Very little occurred between the late October 1939 meeting and the middle of 1940. In June of that year an able and resourceful administrator, Vannevar Bush, quit his job as president of the Carnegie Institute. According to him, a void existed in U. S. nuclear research. His specialty, as he writes it, was redressing "the complete lack of proper liaison between the military and the civilian (sectors) in the development of weapons."[101] Bush visited the Army, Navy, Congress, and the National Academy of Scientists seeking ideas on how to narrow the focus of atomic research.

In the middle of June, Bush convinced the President to establish the National Defense Research Committee (NDRC) with him as its supervisor. This committee immediately absorbed the Uranium Committee and severed military leadership from atomic research.[102] Bush provided what

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[101] Rhodes, The Making of the Atomic Bomb, 336.

[102] The Uranium Committee continued to function, just under the auspices of the NDRC. In fact, in May 1941, the Uranium Committee sponsored a report from the National Academy of Scientists which stated that militarily uses of atomic fission could occur three ways: "production of violently

Szilard had been seeking for over one year - direct ties to the White House for atomic science research. The NDRC would control the funding and act as liaison between the scientists and the White House while the Uranium Committee would continue to direct research. Bush is described as "indispensable" to the development of the U.S. atomic bomb.[103]

It was not until later that Bush believed that atomic bombs could be built. Convinced that pursuing weapons which could destroy entire cities was a waste of effort, he was "initially more interested in proving the impossibility of such a weapon."[104] A little over one year later, after mingling with imaginative and myth-producing scientists, Bush wrote to the President in his official capacity as director of the NDRC, "if such an explosive were made it would be thousands of times more powerful than existing explosives, and its use might be determining."[105]

The NDRC/Uranium Committee structure suffered, however, from an inability to coordinate effectively the activities

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radioactive materials to spread over enemy territory; a power source on submarines and other ships; and production of violently explosive atomic bombs." See Rhodes, The Making of the Atomic Bomb, 365.

[103] Bundy, Danger and Survival, 39.

[104] Rhodes, The Making of the Atomic Bomb, 338.

[105] Bundy, Danger and Survival, 44.

of atomic scientists spread throughout the country. The Office of Scientific Research and Development (OSRD), which was established by an Executive Order in June 1941, was Bush's effort both to amass more authority over the national research effort and to apply scientific research to national defense.[106] The previous year had been filled with scientific advances which inched the United States yet closer to achieving atomic bombs; however, there remained a lack of coherent focus in their efforts. Administrative and coherent focus would come shortly after the summer of 1941.

In 1941, England also had a nationally funded organization dedicated to coordinating atomic research. This group, the "MAUD" committee, shared nearly all of its information with the OSRD.[107] By summer 1941, a technical subcommittee of MAUD confirmed that atomic bombs were feasible through the neutron-induced fission of Uranium 235: "the chain reaction would be so fast that an explosion of tremendous force would take place."[108] The National Academy

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[106] Hewlett and Anderson, The New World, 41.

[107] "MAUD" was supposedly a secret anagram for "radium taken." In fact, it was the first name of the school teacher who had taught Niels Bohr's family English. See Rhodes, The Making of the Atomic Bomb, 341.

[108] There are various versions of how this information was given to U. S. leadership -- but there is little disagreement over the significance of it. The MAUD report illustrated a path to detonating an atomic bomb. See Hewlett and Anderson, New World Order, 41-42, and Rhodes, The Making of the Atomic Bomb, 368-369.

of Scientists (NAS) perused the report from MAUD containing this information and produced their own report for the OSRD and Bush. The NAS concluded that the British had indeed demonstrated a practical method of producing atomic bombs - and recommended that U. S. research be expedited to produce Uranium-based atomic bombs.[109]

Bush delivered this information to Roosevelt in November 1941. Prominent among the assertions of the report were two aspects of the myth of atomic terror, aspects Roosevelt could not possibly have ignored: 1) "a fission bomb of superlative destructive power" is possible, and 2) "adequate care of our national defense seems to demand urgent development of this program (the development of an Uranium bomb)."[110] This report came from a "scientific" organization. The scientists were telling Roosevelt not only that bombs were possible (something he might or might not previously have believed), but that those bombs were essential to national security. It seems the American nuclear scientists were "in the service of a value,"[111] a value important to Roosevelt. Nonetheless, the President

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[109] Rhodes, The Making of the Atomic Bomb, 369.

[110] Quoted in, Rhodes, The Making of the Atomic Bomb, 386-387.

[111] Maslow, The Psychology of Science, pg 28, note 58, this document.

mulled over Bush's report for two months before responding. The approval to focus American research on a uranium bomb came in January 1942.

At first, Bush and the OSRD farmed out the various steps to achieving the bomb to the established laboratories across the country. Research continued at Berkeley, Columbia, Chicago, and Tennessee; however, Bush had bigger goals in mind. His idea was to set up a central laboratory which would permit the scientists to interact and profit from each other's research. As important to Bush and Roosevelt was the increased security achieved through central location of atomic research. It was in 1942 that the names synonymous with the American bomb entered the national scene.

As important as General Leslie Groves, Robert Oppenheimer, and the scientists who went to Los Alamos were to the development the American atomic bomb, their role in the *decision* to launch the program was negligible. By the time their massive contributions were made, the political decisions which facilitated their involvement were completed.

The historical events after 1942 are familiar. Groves traveled to the various laboratories to reconnoiter a scientific leader for the lab, selected Oppenheimer (not a popular proposition), and the site in New Mexico was agreed upon. It is interesting to note that many crucial

scientists initially resisted the idea of a centralized, military-run atomic laboratory. In fact, many were concerned that such a laboratory would threaten their inviolate "scientific autonomy."[112] Perhaps the comfort of their own laboratories provided the only acceptable impetus for scientific research. In any case, the scientists were persuaded that they could continue their research free from critical, government-sponsored examination, they began arriving at Los Alamos in March 1943.

The period from Roosevelt's meeting with Sachs to the establishment of the Los Alamos lab is crucial to the development of the American atomic bomb. While it is true that there was much momentum associated with the scientific progress toward constructing an atomic bomb, the decision to pursue the weapon ultimately rested with Roosevelt. Roosevelt was bombarded with nuclear myths to assist him in his decision-making. It was these myths that became common sense to Roosevelt.

**B. NUCLEAR BOMBARDMENT: MYTHS AND NEUTRONS**

Is it possible to reconstruct Franklin Roosevelt's views on the utility of atomic bombs? Probably not. He did not live to see them used nor did he leave behind voluminous

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[112] Rhodes, The Making of the Atomic Bomb, 454. The nuclear physicist revolt in the name of "scientific autonomy" was led by Rabi at the Massachusetts Institute of Technology.

information regarding his thoughts on the subject. Indeed, very little primary source material remains regarding Roosevelt's nuclear beliefs. What is clear, though, is that he was impressed with the offensive capabilities of an atomic bomb. Also, his primary nuclear lieutenant (Bush) focused on that offensive capability in nearly all of his communication to the President. There is no scarcity of information regarding what Roosevelt was told about an atomic bomb.

Perhaps it is safe to assume that atomic weapons were not very high on Roosevelt's agenda. Certainly he was more concerned with the immediate consequences of international conflict. For Roosevelt, World War II was the international debut for the United States; Roosevelt was convinced from the very beginning that the war would substantially alter the landscape of international relations.[113] Indeed, it would alter that landscape in such a way as to confirm American supremacy. Roosevelt undoubtedly saw the atomic bomb as only a part of this eventuality. I draw inferences about Roosevelt's motivations to pursue the bombs from his general decision-making process, what people told him about the bombs, and the manner in which he pursued them.

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[113] For information regarding Roosevelt's general views on Europe, European conflict, and the role of the United States in a post-war world see John Harper, American Visions of Europe (Cambridge: Cambridge University Press, 1994).

One of Roosevelt's cabinet members, describing how Roosevelt reached decisions, stated the following:

> he worked with human and moral values...he relied upon his intuitive judgment...drew from his memory...exercised imagination...and came to his decision and judgment by a combination of all these qualities.[114]

In other words, Roosevelt was not unlike other leaders who "have to act on their beliefs about the world."[115] He drew from past experiences and attempted to frame new information into a particular cognitive framework. Roosevelt was, "both realist and idealist."[116] Roosevelt, then, was a great American "pragmatist."[117] He believed, most of all, in doing *something*.[118]

Information or beliefs which became common sense to Roosevelt were results of a process. Apparently, the

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[114] Perkins, The Roosevelt I Knew, 163.

[115] Robert Jervis, The Meaning of the Nuclear Revolution (Ithaca: Cornell University Press, 1989), 216.

[116] Burns, Soldier of Freedom, 550.

[117] My use of the term "pragmatist" is "Jamesian." The term describes a traditional American attribute and has two broad implications in American culture: 1) individual reliance, and 2) the ability to devise quick and practical responses to problems. See William James, Pragmatism and Four Essays from the Meaning of Truth (New York: New American Library, 1955).

[118] Perkins, The Roosevelt I Knew, 164. Roosevelt is quoted as having often said, "We have to do something. We have to do the best we know how to do at this moment. We can modify it later."

criteria for that process included listening to trusted advisors, using imagination, relying on memory, and drawing from traditional, cultural American attributes. As President of the United States, Roosevelt was continually compelled to act upon available information. It seems that in doing so he embraced not only myths but the messengers of myths.[119]

Roosevelt's response to Sachs' plea for governmental action is illustrative of this proposition. The assertion that Sachs was "after not seeing the Nazi's blow us up" demonstrates how the President responded first to the individual and then to the problem. I believe Roosevelt did not fear a Nazi atomic bomb - but I also believe he thought Sachs feared it. If Roosevelt did fear a Nazi atomic bomb, might not the "action" he require include finding out all available information regarding such a bomb? Or asking Sachs what he knew of such a bomb? Who knew of such a bomb? Probably so. The fact is that Roosevelt's immediate "action" was a response to another aspect of Sachs' presentation - it was a response to bombs of "hitherto unenvisioned potency and scope." Atomic bombs were valued by Roosevelt for their potential offensive capabilities and

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[119] Bundy, Danger and Survival, 47. Bundy asserts, as I do, that Roosevelt resisted "one-man proposals." However, not one person who saw Roosevelt concerning atomic science was turned away dissatisfied.

not as counter-weights to an alleged German program that he did not fear.

Franklin Roosevelt, by all accounts, had a "meager scientific education."[120] The intricacies of atomic science bored him. He had no interest in understanding what Uranium isotopes were let alone the process by which they are separated from Uranium. Vannevar Bush knew this. Nearly all of Bush's reports to Roosevelt during the early 1940's are teeming with applications of atomic energy. They are teeming with myths of atomic terror. Bush consistently prefaced scientific advancements with destructive nuclear myths.

It was Bush who told the President that atomic bombs would be more explosive than anything known and whose use would be determining. Bush said that in 1941; Soddy said it in 1903. It was Bush who delivered the National Academy of Scientists report which discussed the feasibility of a Uranium bomb, but this was discussed only in the context of such a bomb's potential destructiveness. Bush said that in 1942; Wells said that in 1914. The fact is that the people who had access to Roosevelt, the people he trusted because they were "truthful and wise,"[121] were "spoon feeding" him

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[120] Perkins, The Roosevelt I Knew, 164.

[121] Ibid, 164. Perkins describes how Roosevelt, like the American public, felt this way about all scientists.

atomic terror myths. The bombardment of neutrons in scientific laboratories was not the only "bombardment" going on. Roosevelt, with exception of the Sachs meeting, was never really provided with any other way but atomic terror to think about nuclear technology. Judging from his response to the Sachs meeting, he probably would not have listened to atomic utopia myths anyway.

Jervis says, "the greater the number of analogies available to a (leader), the less will be the influence of each (analogy)."[122] The inverse of this proposition, obviously, is that the fewer the analogies, the more significant each becomes. Roosevelt was susceptible to the atomic terror myth because it was his only "analogy." It was his only analogy for two primary reasons: 1) collective beliefs about atomic terror had evolved, through a social process, into a dominant and hegemonic social theme, and consequently, 2) it was the only coherent belief he was presented. The President was "coerced" into pursuing atomic bombs because his beliefs about those atomic bombs were socially constructed subjective knowledge.

## C. CONCLUSION

The U.S. decision to "go nuclear" has been examined exhaustively. There is wide agreement over the

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[122] Jervis, Perception and Misperception, 269.

chronological events from 1939 to the establishment of the Los Alamos laboratory. Ignored in almost all of this research is the way U.S. leaders thought and talked about nuclear weapons before any weapon existed. The social discourse is ignored. Clearly, myths regarding the utility of atomic technology saturated nearly all communications regarding atomic research to the President. To Roosevelt, physics was interesting not "because it was there" but instead because of what people told him it could do for him. More specifically, nuclear weapons had already come to signify political power for Roosevelt.

I assert that the result of this myth proliferation may have been nuclear proliferation. Roosevelt was inundated with atomic terror myths. These atomic terror myths were rooted, shaped, and substantiated in pre-1945 American cultural texts. If it is true that beliefs are important in policy making, then the sources of those beliefs are at least equally important.

## V. CONCLUSION

Traditional explanations of the U.S. decision to "go nuclear" stress two important factors in U. S. decision making: 1) German nuclear activity, and 2) Einstein's letter describing atomic terror. Einstein's letter is significant, it is often written, against the backdrop of impending war with Germany and the consequences of a Nazi bomb. Einstein's letter is indeed significant, but not because of the imagined and post-scripted German context. The argument that the United States sought atomic bombs to counter German research is consistent with realist proliferation theories. The problem remains, however, that such arguments are not totally consistent with historical facts or with the documented perceptions of the key decision-maker, Roosevelt.

On the other hand, there were discernible cultural referents which provided coherent perceptions regarding the future utility of atomic technology. Such referents evolved over time and were substantiated by American elites. They were also used by Einstein in his letter to Roosevelt. By 1939 the most powerful and persuasive of those referents, the myth of atomic terror, had become culturally-produced "common sense." As such, atomic science was presented to Roosevelt as a tool for producing immensely destructive and politically powerful atomic bombs.

Roosevelt believed in the offensive potential of atomic weapons. He was not compelled to choose a desired atomic myth because he was, essentially, never given a choice. The United States aspired to and acquired nuclear weapons as a result of socially constructed and widely dispersed nuclear myths.

This thesis began with the emergence of images of nuclear technology. Such images were present in elements of popular culture, widely disseminated periodicals, and statements by social elites. From 1900 to 1945, the images were refined, clarified, and dispersed to the highest echelons of American government. By the time they reached the President of the United States, they were myths about the future utility of atomic technology. Roosevelt was privy to the myth of atomic terror. It was that myth which might have eventually caused American nuclear scientists to gather at Los Alamos in 1943.

## A. IMPLICATIONS FOR CONTEMPORARY UNDERSTANDING

Socially constructed nuclear myths precipitate nuclear desires. Desires emerge from beliefs, and as Jervis states, "leaders must act on their beliefs." In the case of nuclear technology, beliefs about nuclear weapons arise from a social discourse. Of course, there now exist real events with which to connect the power of nuclear technology.

Hiroshima, Nagasaki, Three Mile Island, and Chernobyl are examples nuclear technology's destructive potential. That these events occurred, are significant, and caused widespread disaster are not in dispute. However, in the context of beliefs about the utility of atomic technology, Hiroshima, Three Mile Island, etc., are significant only for the manner in which their chaos was represented. Understanding this representation, the nuclear myths about those events whose truth is accepted uncritically, is imperative to understanding nuclear beliefs. Such myths are now included in the social discourse. Perhaps social discourses, this new level of analysis, will explain contemporary cases of nuclear aspirations.

The beginnings of the U.S. nuclear program can be traced as far back as H. G. Wells and Fredrick Soddy. The images they created to represent nuclear technology demonstrated remarkable longevity and consistency over 40 years. Such images were passed between and among other texts, scientists, and journalists. Such images were the basis for a social discourse.

Further use of the "social discourse" level of analysis might prove fruitful to understanding why countries want nuclear weapons. A study at this level would require the investigator to thoroughly examine popular cultural media, mass distributed periodicals, and statements by influential elites. From this examination, the investigator may

determine the prevailing nuclear myths.[123] It is from these prevailing nuclear myths that inferences about the nature of the social discourse may be drawn.

Perhaps there are also general hypotheses which can be formulated through the social discourse level of analysis. For example, if the prevailing nuclear myths in the country under consideration describe atomic technology as an immensely destructive force, then decision makers may be predisposed to believe that such a destructive force is politically useful. If decision makers believe nuclear weapons are politically useful, then they might desire nuclear weapons. By contrast, if nuclear myths describe atomic technology as the key to a bountiful paradise, then maybe decision makers will pursue avenues to achieve such a paradise. The crucial element, however, is the nature of the nuclear myths. By studying nuclear myths, proliferation investigators will trace the causal chain to nuclear desires as far back as possible. A diagram of a potential theory, as contrasted to traditional explanations, would appear as follows:

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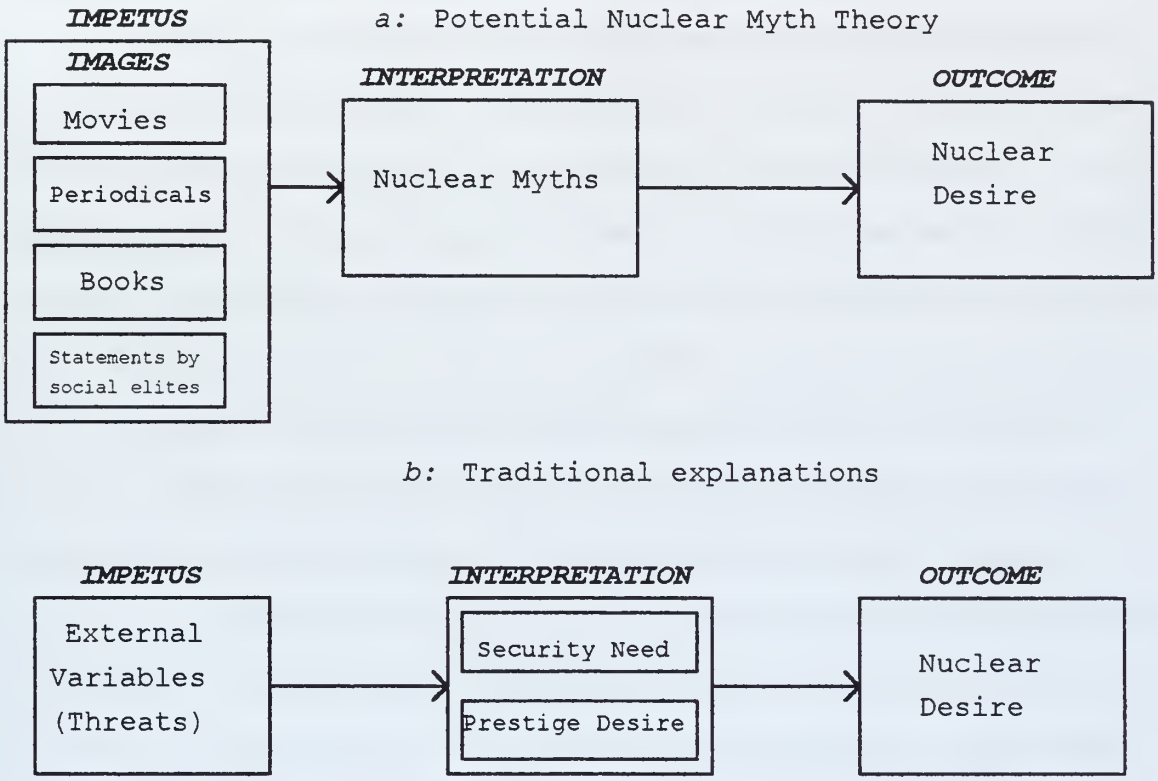
[123] Nuclear myths, clearly, are case specific. As they are based upon cultural texts and domestic phenomena, nuclear myths arise from case-specific variables.

***Figure 1:*** Line diagrams of Nuclear Myth Theory and traditional explanations for Nuclear proliferation




In this diagram, the "impetus" is the motivating variable which initiates thought about nuclear weapons. At the nature of the social discourse level of analysis, the impetus is provided through images presented in cultural texts. Traditional explanations, remaining at the decision-maker or international level of analysis, rely on external phenomena to explain the impetus. The "interpretation" of that impetus is the source of desires for nuclear weapons. I believe nuclear myths may be the source, realists assert notions of security and prestige are the source. Finally,

the "outcome" of that interpretation is the desire for nuclear weapons.

Because images presented in cultural texts are socially constructed, and such images become nuclear myths, then nuclear myths might or might not be empirically verifiable. That is, the content of truth in nuclear myths might or might not be evaluated. Nuclear myths are not significant because they may or may not be true, they are significant because people believe them.

Brodie's assertion that everything about nuclear weapons is overshadowed by the fact that they exist is incorrect. While nuclear weapons do exist and undoubtedly are immensely destructive, this is not the key to understanding why people want them. What people believe about atomic bombs and the sources of those beliefs are germane.

## B. NUCLEAR MYTHS AND U.S. INTELLIGENCE

There are clear policy and intelligence ramifications derived from this approach. U.S. intelligence has been mandated to provide information regarding the motivations of states who desire to acquire nuclear weapons. Currently, U.S. military intelligence funding and effort in this regard has been negligible. Many U.S. intelligence organizations maintain that nuclear desires arise from security threats or aspirations for international prestige. While such a focus

may provide hints regarding why certain countries pursue nuclear weapons, alternative levels of analysis must be explored.

I suggest that human intelligence assets may be useful in understanding nuclear desires. In fact, to obtain any meaningful awareness of a suspect country's customs, beliefs, and traditions, American intelligence assets are required to immerse themselves into that country's culture. Even then, there is no guarantee that consequential information regarding the sources of beliefs will become clear. Misunderstandings will remain the norm. However, U.S. intelligence, much like Roosevelt, has no choice. Useful knowledge concerning nuclear desires can only result from useful knowledge concerning nuclear beliefs. Clearly, nuclear beliefs stem from socially constructed, dispersed, and perpetuated cultural systems.

Therefore, I recommend that U.S. intelligence assets organize their collection efforts in the following manner: 1) recognize that not all desires for nuclear weapons stem from realist paradigms, 2) acknowledge that perhaps culturally produced collective beliefs influence decision-makers, 3) understand that those beliefs will be manifested in cultural texts (movies, books, magazines), daily periodicals, and statements by influential social elites, and 4) attempt to connect the beliefs described above with either state action or statements by policy makers. I

assert that should U.S. intelligence focus on these four recommendations, meaningful understanding about the initial sources of nuclear desires will emerge.

## BIBLIOGRAPHY


Bailey, Kathleen. 1993. Strengthening Nuclear Non-Proliferation. Boulder: Westview Press.

Berger, Peter and Luckmann, Thomas. 1966. The Social Construction of Reality. New York: Doubleday.

Boulding, Kenneth. 1966. The Image: Knowledge and Life in Society. Ann Arbor: University of Michigan Press.

Broderick, Mick. 1991. Nuclear Movies. Jefferson, N. C.: McFarland and Company, Inc.

Bundy, McGeorge. 1988. Danger and Survival: Choices about the Bomb in the First Fifty Years. New York: Random House.

Burns, James MacGregor. 1970. Roosevelt: The Soldier of Freedom. New York: Harcourt, Brace, Jovanovich.

Eckstein, Harry. 1975. "Case Study and Theory in Political Science." In F. I. Greenstein and N. W. Polsby, eds., Handbook of Political Science. Reading: Addison-Wesley.

Eckstein, Harry. 1971. "Comparative Politics and the Comparative Method," American Political Science Review. Vol 65 (September 1971).

Field, Bernard and Gertrud Szilard, eds., 1972. The Collected Works of Leo Szilard: The Scientific Papers. Cambridge: MIT Press.

Foucault, Michel. 1972. The Archeology of Knowledge. New York: Pantheon.

Foucault, Michel. 1980. Power/Knowledge. New York: Pantheon.

Frankel, Benjamin. 1990. "International Political Changes and Nuclear Proliferation in the 1990's." In Eric Arnett, ed., Science and International Security: Responding to a Changing World. Washington: American Association for the Advancement of Science.

Freedman, Lawrence. 1981. The Evolution of Nuclear Strategy. New York: St. Martin's Press.

George, Alexander. 1979. "Case Studies and Theory Development: the Method of Structured, Focused Comparison." In Hall, Gordon, Lauren, eds., Diplomacy: New Approaches in History, Theory, and Policy. New York: Free Press.

George, Alexander. 1979. "The Causal Nexus Between Cognitive Beliefs and Decision-Making Behavior: The Operational Code Belief System," In Lawrence Falkowski, ed., Psychological Models in International Politics. Boulder: Westview Press.

Gilpin, Robert. 1962. American Scientists and Nuclear Weapons Policy. Princeton: Princeton University Press.

Gramsci, Antonio. 1974. Selections from the Prison Notebooks. ed and trans by Quinton Hoare and Geoffrey Nowell-Smith. New York: Lawrence and Wishart.

Harper, John. 1994. American Visions of Europe. Cambridge: Cambridge University Press.

Harper's.

Hewlett, Richard and Anderson, Oscar. 1990. New World: A History of the United States Atomic Energy Commission. Berkeley: University of California Press.

Inglis, Fred. 1993. Cultural Studies. Cambridge: Blackwell.

Jervis, Robert. 1976. Perception and Misperception in International Politics. Princeton: Princeton University Press.

Jervis, Robert. 1989. The Meaning of the Nuclear Revolution. Ithaca: Cornell University Press.

Kaempffert, Waldemar. 1953. Explorations in Science. New York: Viking Press.

Keohane, Robert. 1986. "Realism, Neorealism, and the Study of World Politics." In Robert Keohane, ed., Neorealism and its Critics. New York: Columbia University Press.

Lapp, Ralph. 1970. Arms Beyond Doubt: The Tyranny of Weapons Technology. New York: Cowles.

Latour, Bruno. 1983. "Give me a Laboratory and I will Raise the World," Karin Knorr and Michael Mulkay, eds., Science Observed. London: Sage Press.

Laurence, William. 1959. Men and Atoms. New York: Simon and Schuster.

Lavoy, Peter. "Nuclear Myths and the Causes of Nuclear Proliferation," Security Studies. Vol 2 Spring/Summer, 1993.

Lifton, Robert Jay. 1967. Death in Life: Survivors of Hiroshima. New York: Simon and Schuster.

Lifton, Robert Jay and Falk, Robert. 1982. Indefensible Weapons: The Political and Psychological Case Against Nuclearism. New York: Basic Books.

Lijphart, Arend. 1971. "Comparative Politics and the Comparative Method," American Political Science Review. Vol 65 September, 1971.

Maslow, Abraham. 1966. The Psychology of Science. New York: Harper and Row.

Michael, Mike. 1996. Constructing Identities. London: Sage Publications.

Morganthau, Hans. 1972. Science: Servant or Master. New York: New American Library.

New York Times.

Perkins, Frances. 1946. The Roosevelt I Knew. New York: Harper and Row.

Quester, George. 1991. "Conceptions of Nuclear Threshold Status." Regina Owen Karp, ed., Security with Nuclear Weapons?. Oxford: Oxford University Press.

Rhodes, Richard. 1987. The Making of the Atomic Bomb. New York: Simon and Schuster.

Rosenau, James. 1986. "Before Cooperation: Hegemons, Regimes, and Habit driven Actors in World Politics," International Organization. Vol 40 (Autumn, 1986).

Simmons, Jon. 1995. Foucault and the Political. London: Routledge.

Smith, Jeff. 1989. Unthinking the Unthinkable: Nuclear Weapons and Western Culture. Bloomington: Indiana University Press.

Smith, Alice Kimball and Weiner, Charles, ed. 1980. Robert Oppenheimer: Letters and Recollections. Stanford: Stanford University Press.

Time.

Tetlock, Phillip. 1989. "Methodological Themes and Variations." In Phillip Tetlock, Jo Husbands, Robert Jervis, Paul Stern, and Charles Tilly, eds., Behavior, Society and Nuclear War. Oxford: Oxford University Press.

Tugwell, Rexford. 1967. Franklin Delano Roosevelt: Architect of an Era. New York: MacMillan.

Weart, Spencer. 1988. Nuclear Fear: A History Of Images. Cambridge: Cambridge University Press.

Wells, H. G. 1914. The World Set Free. London: MacMillan.

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